EXTREME FLIGHT RADIO CONTROL™

STATE-OF-THE-ART R/C AEROBATIC AIRCRAFT AND ACCESSORIES

78" EXTRA 300 ARF

Instruction Manual

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Please take a few moments to read this instruction manual before beginning assembly. We have outlined a fast, clear and easy method to assemble this aircraft and familiarizing yourself with this process will aid in a quick, easy build.

Please read the following paragraph before beginning assembly of your aircraft!

THIS IS NOT A TOY! Serious injury, destruction of property, or even death may result from the misuse of this product. Extreme Flight RC is providing you, the consumer with a very high quality model aircraft component kit, from which you, the consumer, will assemble a flying model. However it is beyond our control to monitor the finished aircraft you produce. Extreme Flight RC will in no way accept or assume responsibility or liability for damages resulting from the use of this user assembled product. This aircraft should be flown in accordance to the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured, and to operate your model at AMA sanctioned flying fields only. If you are not willing to accept ALL liability for the use of this product, please return it to the place of purchase immediately.
Extreme Flight RC, Ltd. guarantees this kit to be free of defects in materials and workmanship for a period of 30 DAYS from the date of purchase. All warranty claims must be accompanied by the original dated receipt. This warranty is extended to the original purchaser of the aircraft kit only.
Extreme Flight RC in no way warranties its aircraft against flutter. We have put these aircraft through the most grueling flight tests imaginable and have not experienced any control surface flutter. Proper servo selection and linkage set-up is absolutely essential. Inadequate servos or improper linkage set up may result in flutter and possibly the complete destruction of your aircraft. If you are not experienced in this type of linkage set-up or have questions regarding servo choices, please contact us at info@extremeflightrc.com or 770-887-1794. It is *your* responsibility to ensure the airworthiness of your model.

A few tips to ensure success

1. **We are very pleased with the level of craftsmanship displayed by the builders in our factory. Through hundreds of grueling test flights containing maneuvers that no aircraft should be subjected to, our prototypes have remained rigid and completely airworthy. However, it is impossible for us to inspect every glue joint in the aircraft. Take a few minutes and apply some medium CA to high stress areas such as servo mounting trays , landing gear blocks, anti rotation pins, etc.**
2. **Having survived the journey half way around the world while experiencing several climate changes, it is not uncommon for a few wrinkles to develop in the covering. Fear not! These are not manufacturing defects, and are easily removed with a little bit of heat. Use a 100% cotton tee-shirt and your heat gun and heat the covering while gently rubbing the covering onto the wood with the t-shirt. Be careful not to use too much heat as the covering may shrink too much and begin to lift at the edges. Take your time, and a beautiful, paint like finish is attainable.**
3. **By the time your aircraft arrives at your door step it will have been handled by a lot of people. Occasionally there are small dings or imperfections on some of the surfaces. An effective method to restore these imperfections to original condition is to use a very fine tipped hypodermic needle to inject a drop of water under the covering material and into the ding in the wood. Apply heat to the area with a sealing iron and the imperfection will disappear. Deeper marks may require that this process be repeated a couple of times to achieve the desired result, but you will be surprised at how well this technique works.**
4. **DO NOT SKIMP ON SERVOS! Your aircraft is equipped with very large control surfaces that deflect over 45 degrees. A lot of servo power is required to prevent flutter and to maintain the required deflection for maneuvers. We absolutely recommend the use of METAL GEARED servos with a minimum of 120 oz. in of torque.**
5. **Use a high quality epoxy for installing the composite control horns and hinges. We highly recommend the use of Pacer Z-Poxy 30 minute formula. We have used this glue for many years with zero failures. Recently we have been experimenting with Pacer Hinge Glue and are very pleased with the results and ease of application and clean up.**
6. **You may want to add a bead of silicone glue (Pacer Zap-A-DAP-A-GOO, etc.) or RC-56 Canopy glue to the intersection of the plastic canopy/hatch and its wood frame for additional strength and resistance to vibration. DO NOT USE CA here as it will fog the canopy.**
7. **Your aircraft is built using very modern construction techniques and is very light weight for its size. As with any high performance machine, regular inspection and maintenance is a must. While disassembling your aircraft after a flying session, pay close attention and inspect glue joints, linkages and loose covering to be sure the airframe is sound. A few minutes spent doing this will help maintain airframe longevity.**

Congratulations on your purchase of the Extreme Flight RC 78 inch Extra 300 ARF! This aircraft is unique in that it is being offered in two versions: A gas/glow version and a dedicated electric version to satisfy the growing legions of electric power enthusiasts. There are subtle differences in the construction of these two versions to accommodate the installation of the chosen power systems. The gas version can be effectively powered by any of the numerous glow engines in the 1.40-1.80 class or with a 30cc-40cc gas engine. The electric version will perform best when powered with a 2500-3000 Watt power system on 8S or 10S Lithium Polymer batteries. Either version will allow you to perform tournament level maneuvers with an economical power plant, allowing you to experience the performance and stability of a much larger aircraft at a considerable savings.

The Extreme Flight Extra 300 is loaded with unique features, including first rate hardware and components and thorough instructions to ensure a trouble free assembly and set-up. Weight saving components are used throughout, such as carbon fiber structural reinforcement, carbon fiber wing and stab mounting tubes, aluminum landing gear, titanium pushrods and a carbon fiber tail wheel assembly, all ensuring the lightest, most high performance aircraft possible.

You will notice there is a box built into the bottom of the glow/gas version of the Extra's fuselage. This is a pipe tunnel and will accommodate most canister mufflers and tuned pipes sold for the current makes of 30-40cc gas engines.

The performance ability of the Extreme Flight RC Extra 300 is phenomenal! This sleek, fast and agile airframe is completely unlimited in its ability to perform the full range of full stall high alpha maneuvers and aggressive gyroscopic tumbling maneuvers. The Extra is also a top notch precision aerobatic machine. It is capable of performing the entire FAI catalog of maneuvers and it has the kind of "big plane" presence in the air that will impress the judges. This makes the 78 inch Extra a great candidate for IMAC competition.

We have spent a great deal of time and effort to provide you, the discriminating aerobatic enthusiast, with the highest quality, most complete package possible. We are very proud of the end result of our labor and wish you great success with the assembly and flying of your Extreme Flight RC 78 inch Extra 300!

Your new Extreme Flight 50cc Extra 300 includes most necessary hardware with the exception of a spinner and electric motor mount. We highly recommend the use of the Extreme Flight 76mm Elite series electric spinner.

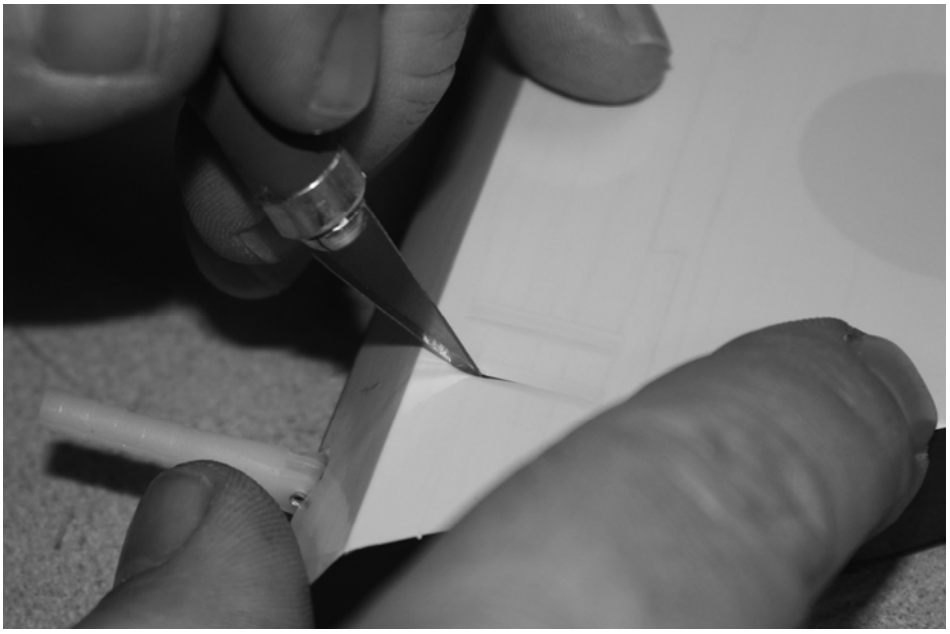
You will find a complete pull-pull system, as well as high quality heavy duty ball links, titanium turnbuckle pushrods and composite control horns, and a carbon fiber tailwheel assembly.

The bonded sealing washers are used when mounting the cowl and canopy/hatch (the electric version uses a spring loaded dual hatch latch configuration). When the bolts used to retain the canopy/hatch and cowl are tightened against the bonded sealing washer, the rubber on the washer compresses, preventing the bolt from backing out. The rubber on the washer also protects the surface of the cowl. Tighten the bolts until the rubber compresses, but do not allow the metal part of the washer to make contact with the cowl.

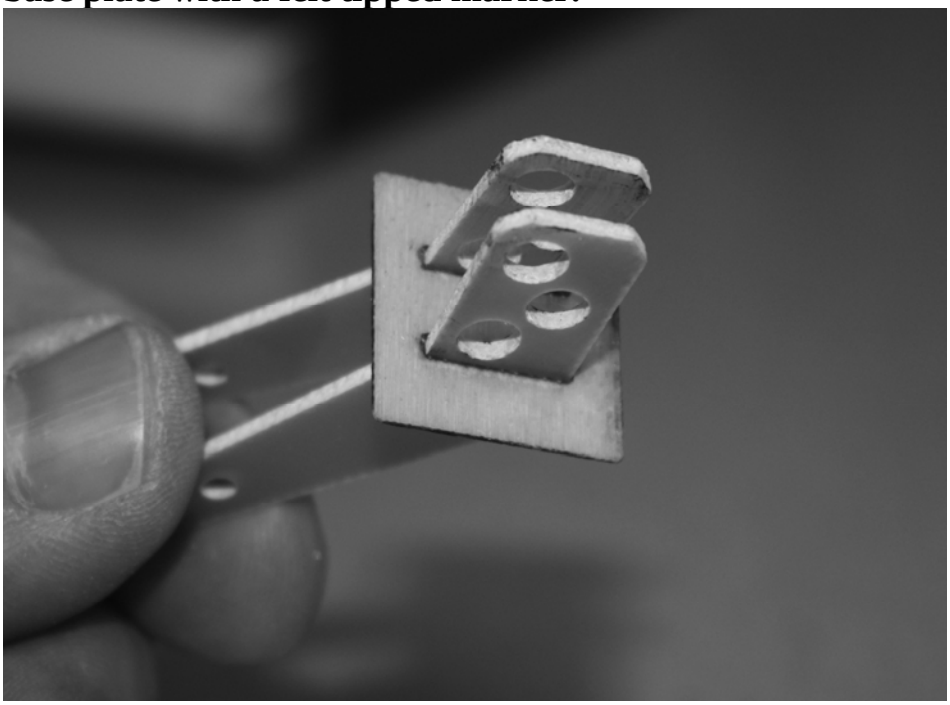
For best results, remove all set screws from the tailwheel assembly and disassemble the unit. File flat spots on the tailwheel wire so that all set screws will seat properly. Place a drop of blue Loctite on all set screws and re-insert them into their holes.

Elevator

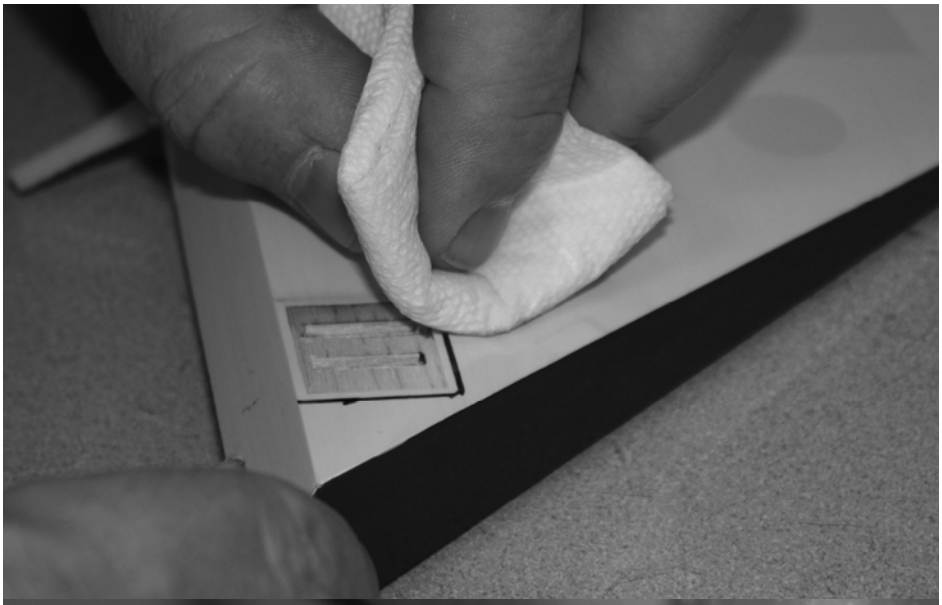
1. Locate the horizontal stabilizer/elevator assemblies as well as the composite control horns and base plates from the elevator hardware package. Use a sharp #11 blade to make a cut in the covering over the 2 slots for the elevator control horns on the bottom of the elevator surface. Double check to make sure you are cutting into the bottom of the elevator.

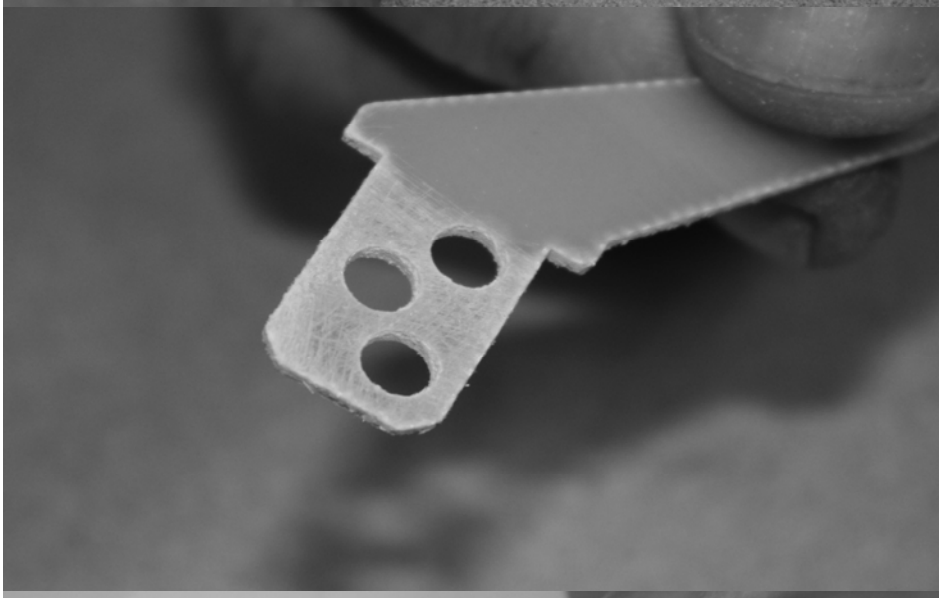


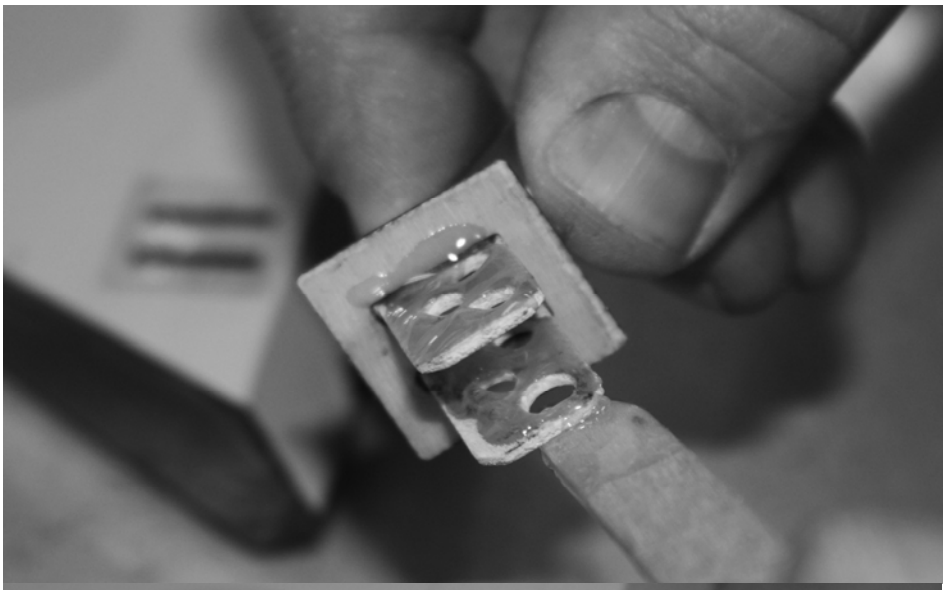
2. Insert the 2 control horns into the base plate and trial fit the horns into the slot and make sure they seat properly against the base and elevator surface. Trace around the base plate with a felt tipped marker.

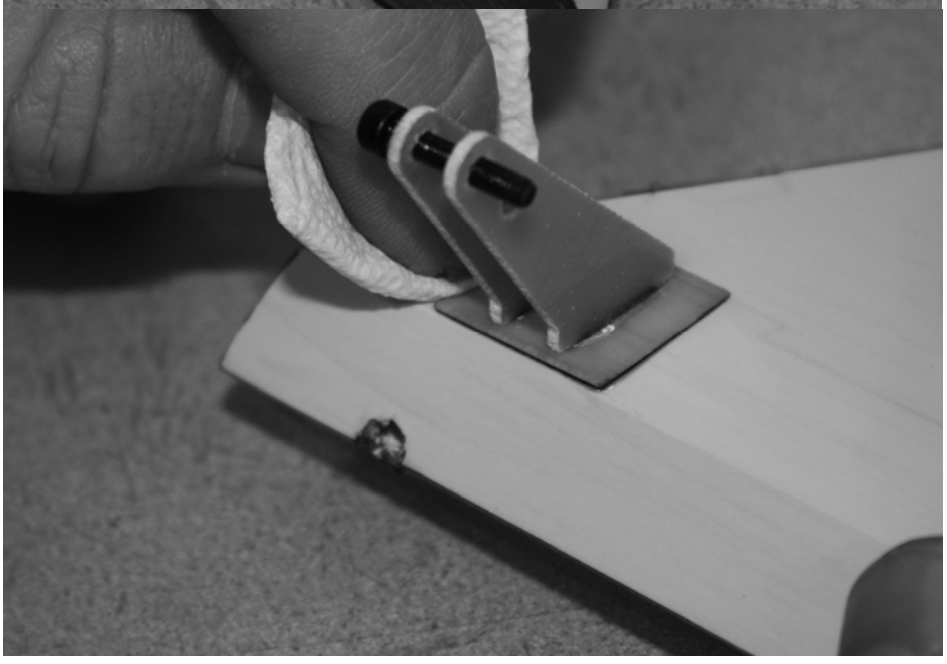


3. Remove the horn assembly and use your #11 blade to remove the covering from inside the ink line you traced around the control horn base. Wipe away the ink line with a paper towel soaked in denatured alcohol. Scuff the portion of the horns that will be inserted into the elevator with sandpaper. Apply 30 minute epoxy to the slots and thoroughly coat the horns and base plate bottom. Reinsert the assembly into the elevator and wipe away any excess epoxy with a paper towel and denatured alcohol. Place a 3mm bolt through the horns to help insure proper alignment and set aside to dry. Repeat for the other elevator half.







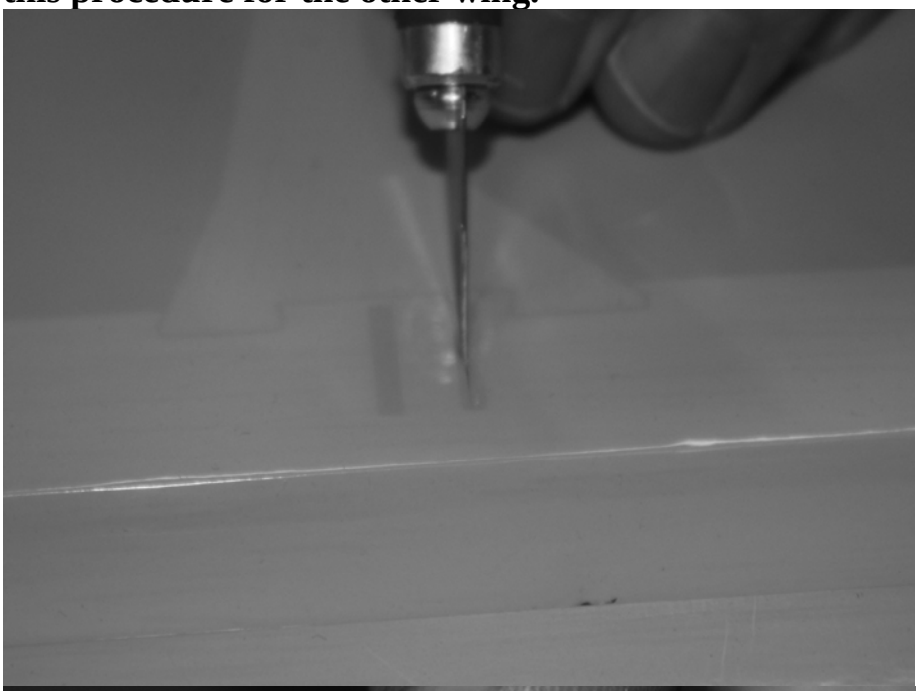


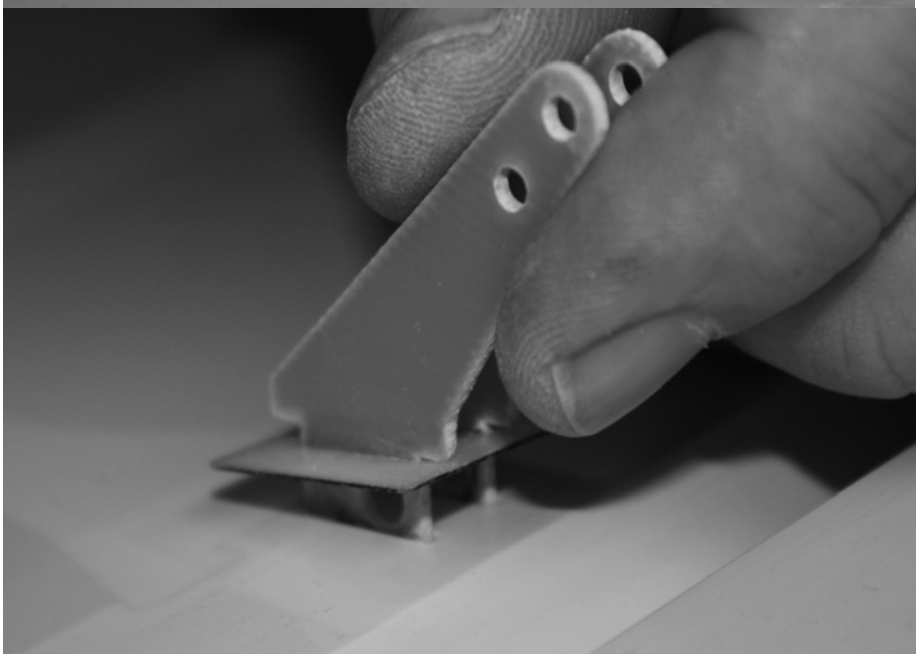
4. In this step I will outline the procedure we use to install the hinges. There are several ways to do this and several adhesives you can use. We will describe the way we do it, as this method has proven itself over many years of model building. If you are new to this type of hinging process then I recommend that you install a single hinge first just to acquaint yourself with this method. Before starting the process get a few items together that will aid you as you proceed. You will need the following items: 30 minute epoxy (we recommend Pacer Z-Poxy), a scrap piece of pushrod or 1/8" dowel, paper towels and denatured alcohol. Locate 3 hinges per elevator half. You will need to cut 1 hinge just beyond the second knuckle to clear the fiberglass tube socket in the stabilizer.
Insert the carbon fiber wing tube into the socket while testing for proper hinge length to avoid damaging the fiberglass sleeve. Mix a generous batch of 30 minute epoxy. Use the pushrod or dowel to thoroughly coat and fill the hinge hole with epoxy, then coat the hinge with epoxy. Push the hinge into its hole until the joint is about a ¼" from its final position and use a paper towel to remove the excess epoxy that has been forced from the hole. Push the hinge the rest of the way in and make sure the hinge pin is centered in the hinge line. Use some denatured alcohol and a paper towel to remove all excess epoxy, especially on the hinge pin. When you are satisfied with the result set the surface aside to dry. Position the drying piece so that any excess epoxy will pool around the rear of the hinge. When you are comfortable with this process you should be able to do one side of a surface per batch of epoxy. Glue all hinges into the stabilizer first. After the glue has set trial fit the elevator to the stab and adjust if necessary. There should be as little gap as possible between the stab and elevator. When satisfied with the fit remove the elevator and repeat the gluing process outlined above. Be sure to wipe away all excess epoxy! Set aside to dry. Repeat this process for the other stab/elevator half.

5. After the hinges have dried thoroughly, pull on them to make sure they are properly installed. The hinges will probably feel a little stiff as it is almost impossible to get all of the glue out of the knuckle joint. Use a fine tipped hypodermic needle and place one (only one!) drop of acetone on each side of the hinge pin. Move the elevator back and forth a few times and you will feel it loosen up. Be careful to only use one drop as you don't want to weaken the glue joint! Add a drop of penetrating oil to each hinge pin and you will ensure a smooth operating surface with no binding. Seal the bottom of the hinge gap with a strip of Ultracote or Blenderm tape. Be sure to fully deflect the control surface when applying the tape or Ultracote to allow full deflection once the gap is sealed. Repeat this process for the other stab/elevator assembly. Before you set aside the stabs take a moment with your covering iron and go over all of the seams with a medium heat setting, paying special attention to the ends of thin trim stripes. At this point clean the 2 elevator/stab assemblies with Windex and set them aside.

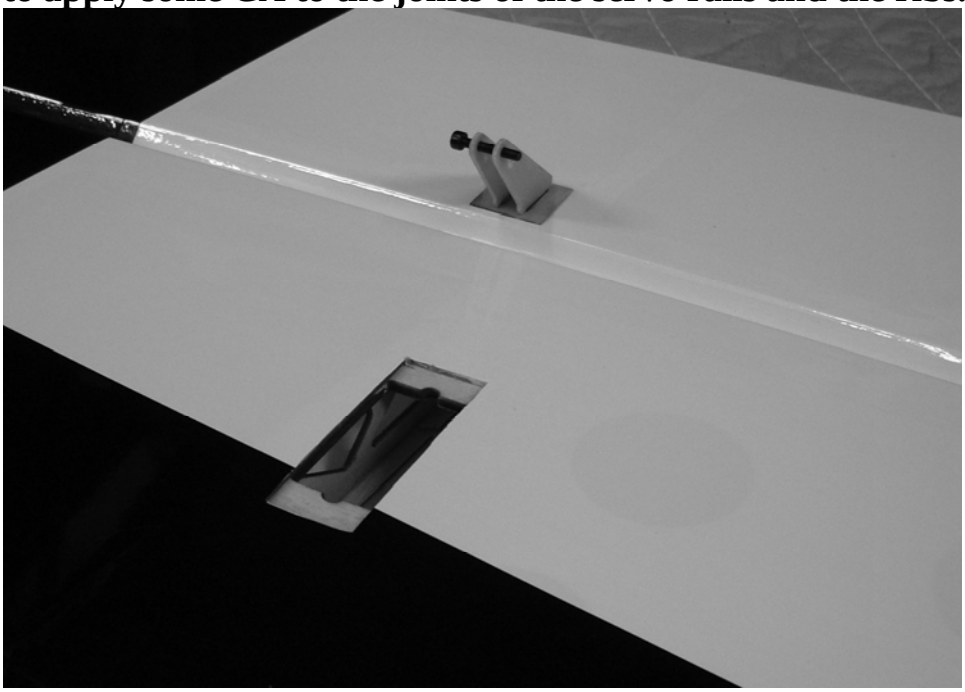
Wing Assembly

6. The assembly process for the wing is almost identical to that of the stab/elevator. For this reason we will not go into quite as much detail as in the previous procedure. Remove the aileron from the wing panel. Locate the 2 slots for the control horns and remove the covering from the slots with a sharp #11 blade. Follow the same procedure as outlined previously to install the control horns into the control surface and hinge the wing. Repeat this procedure for the other wing.

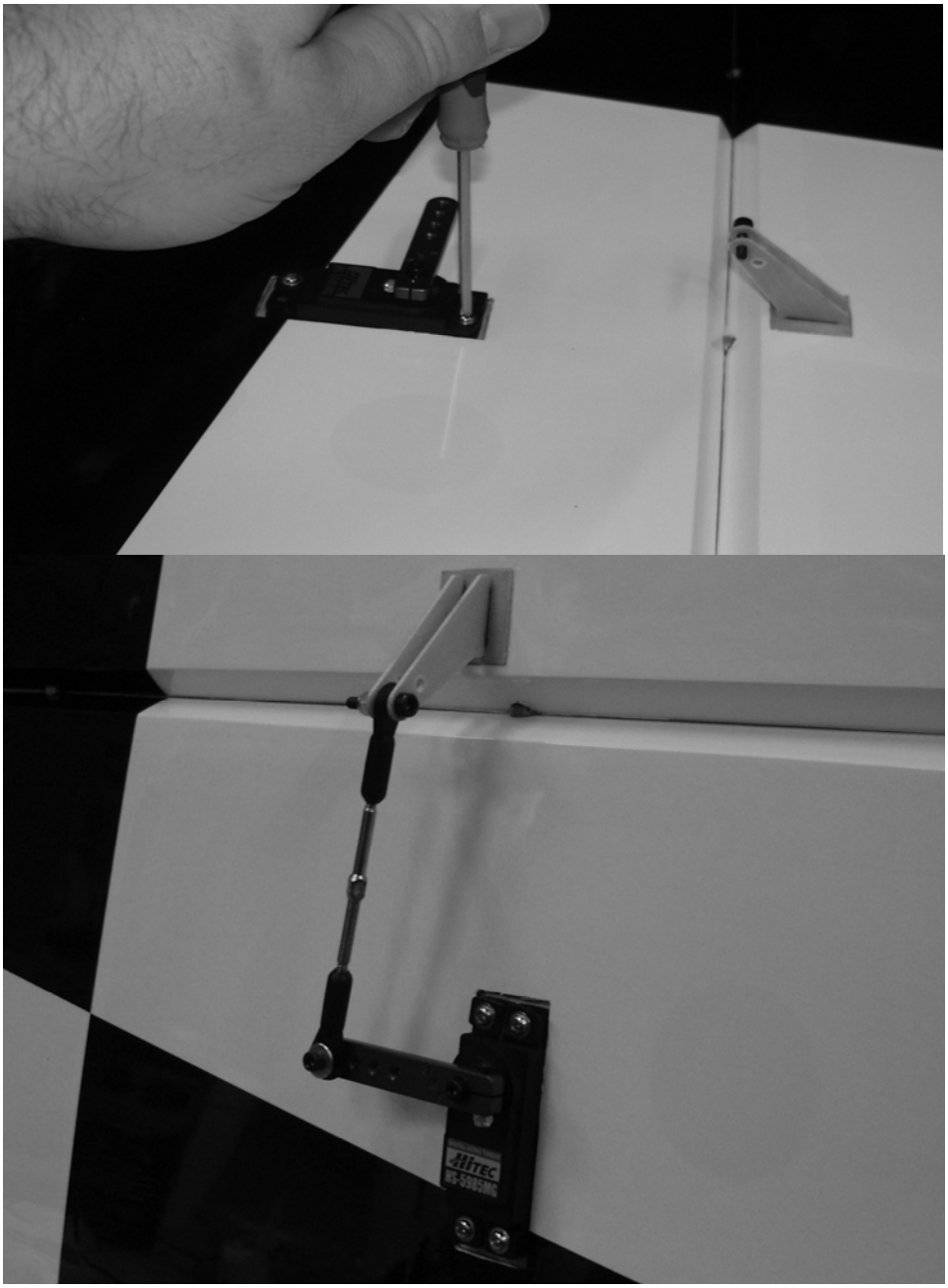




7. Locate the aileron servo mount and remove the covering from this area. Use a sealing iron to seal the edges of the covering to the sides of the servo opening. Take a few minutes to apply some CA to the joints of the servo rails and the ribs.



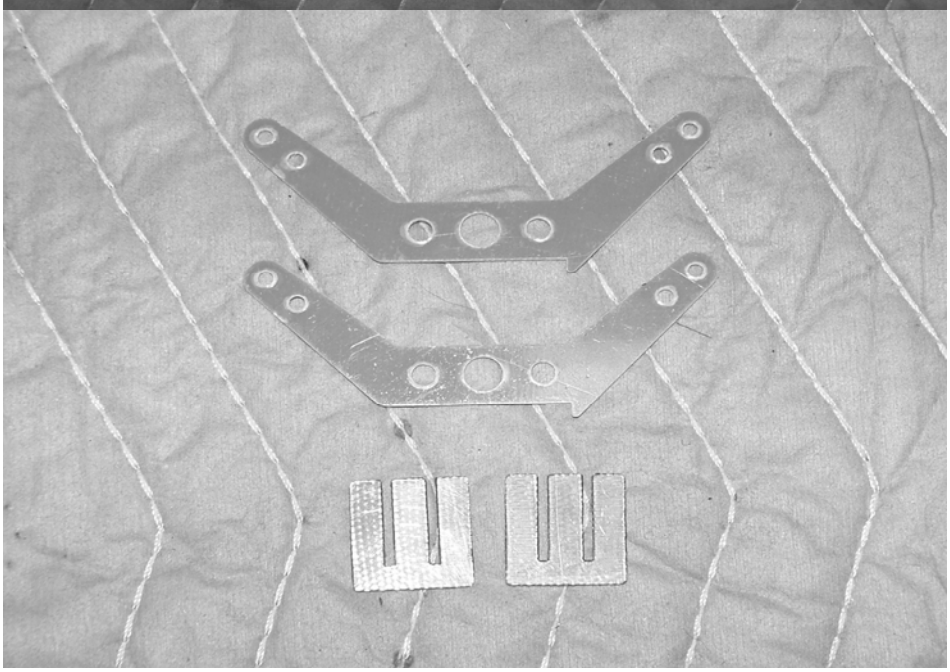
8. Attach a 12" servo extension to your servo and secure with thread or heat shrink tubing. Use the manufacturer supplied mounting hardware and install the servo with the output shaft toward the trailing edge of the wing. Electronically center your servo. Aileron servo arm length should be 1.50". We use and recommend the SWB double lock aluminum arms. Thread 2 ball links onto the titanium turnbuckle pushrod. Secure the pushrod to the control horns and servo arm as shown in the picture using the supplied 3mm bolts and nylon insert locknuts. As always, use blue Loctite on ALL bolts!

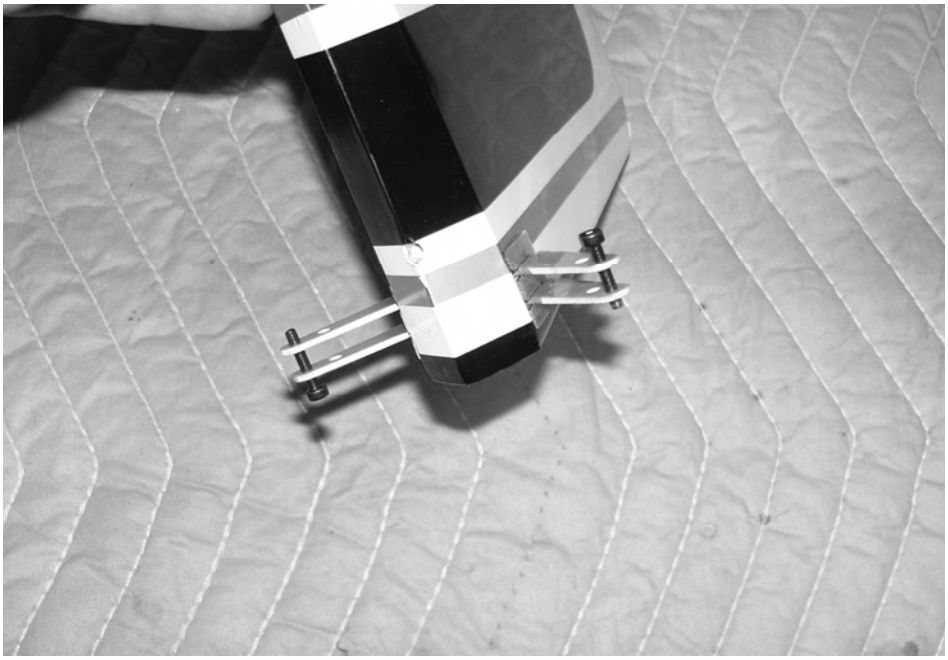


9. Before beginning the next assembly process, take a few minutes with your sealing iron on a medium heat setting and go over all seams, paying special attention to thin trim stripes and the seam at the leading edge of the wing. If there are wrinkles in the covering on the leading edge sheeting use a heat gun with a 100% cotton t-shirt to remove them and prevent digging into the wood with an iron. Use caution and avoid excessive heat as you may cause the Ultracote to shrink too much and lift at the seams. Also take the time to seal the hinge gaps with Ultracote or Blenderm tape. Clean the wings with Windex and put them away.

Rudder and tailwheel assembly and mounting

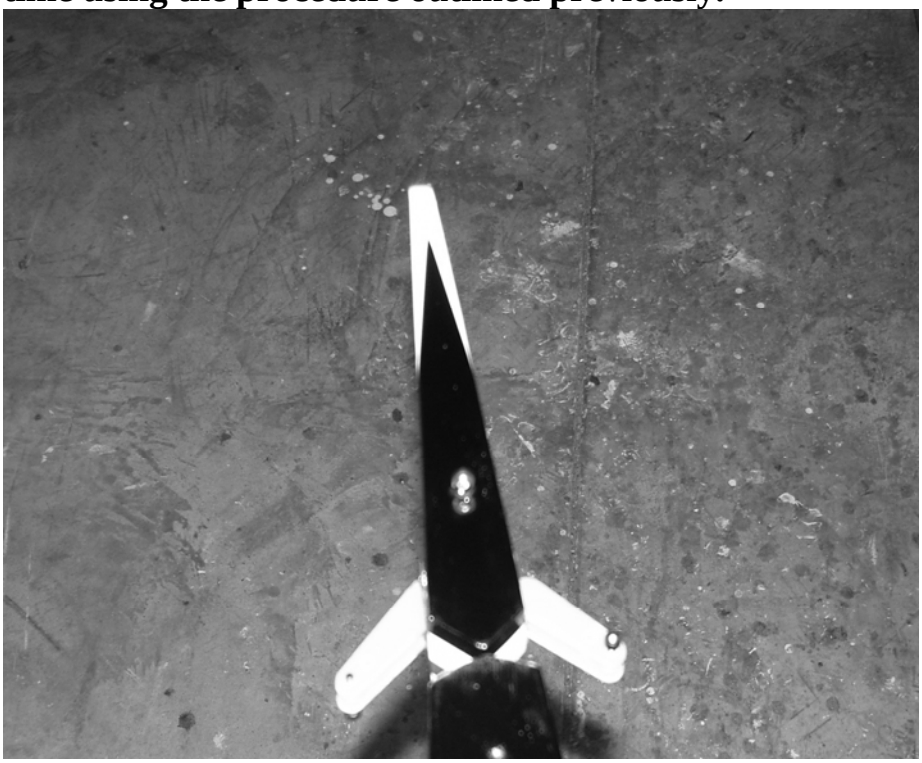
10. Locate the rudder, the rudder control horns and the 2 slotted base plates. Use a sharp #11 blade to remove the covering from the 2 pre-cut slots in the rudder. Trial fit the 2 servo horns through the slots in the rudder and into their proper position. Measure to ensure they are centered and mark with a fine tipped felt pen to make it easy to reinstall properly when epoxy is applied. Remove the control horns and cut away the covering from the area where the base plates will go as done previously with the aileron and elevator. Mix up some 30 minute epoxy and use a small blade to fill the 2 slots with epoxy. Use plenty of epoxy and be sure to completely fill the two slots. Use an epoxy brush to completely cover the areas on the rudder horns and base plate that will glue into the rudder. Slide the rudder horns back into their proper position and immediately wipe the excess epoxy from the horns. Carefully check and re-check alignment to insure proper positioning. Use some denatured alcohol and a paper towel to remove any excess epoxy. Re-check the alignment one more time and set the assembly aside to dry.





11. Locate a 2mm ball link from the hardware bag. Drill a hole 2 inches back from the leading edge of the rudder on the bottom of the rudder surface to accept the shank on the ball link.

12. Scuff the shaft of the ball link with coarse sandpaper. Mix up a small amount of 5 minute epoxy and apply it to the ball link and the hole in the bottom of the rudder. Push the ball link into the hole as shown in the picture. Use a little excess epoxy to form a fillet around the bottom of the ball link. Make sure the hole in the brass ball is aligned front to rear to accept the tailwheel tiller arm. Go ahead and glue the hinges into the rudder at this time using the procedure outlined previously.

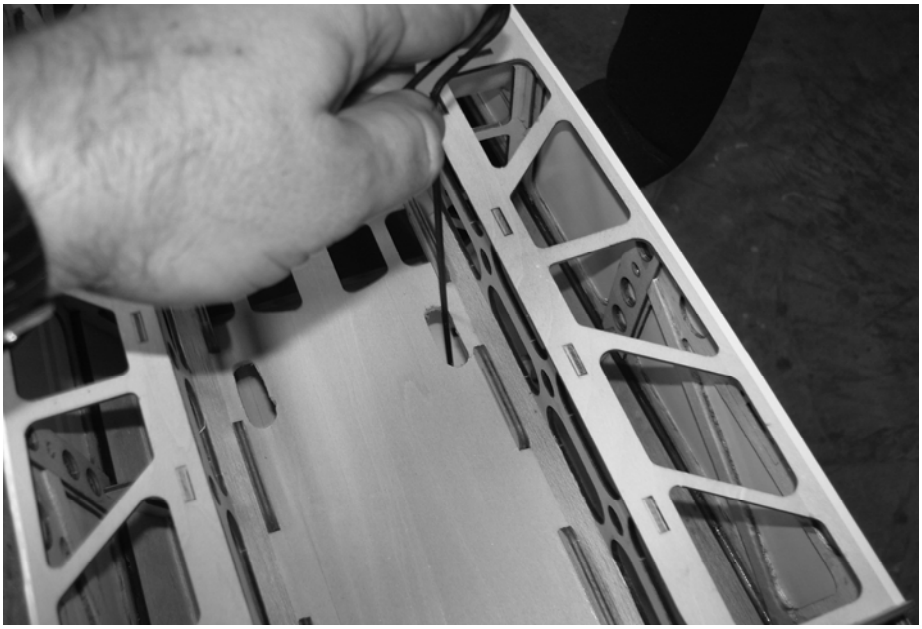


13. While this dries let's prepare the tailwheel assembly and get it mounted. First disassemble the tailwheel assembly.

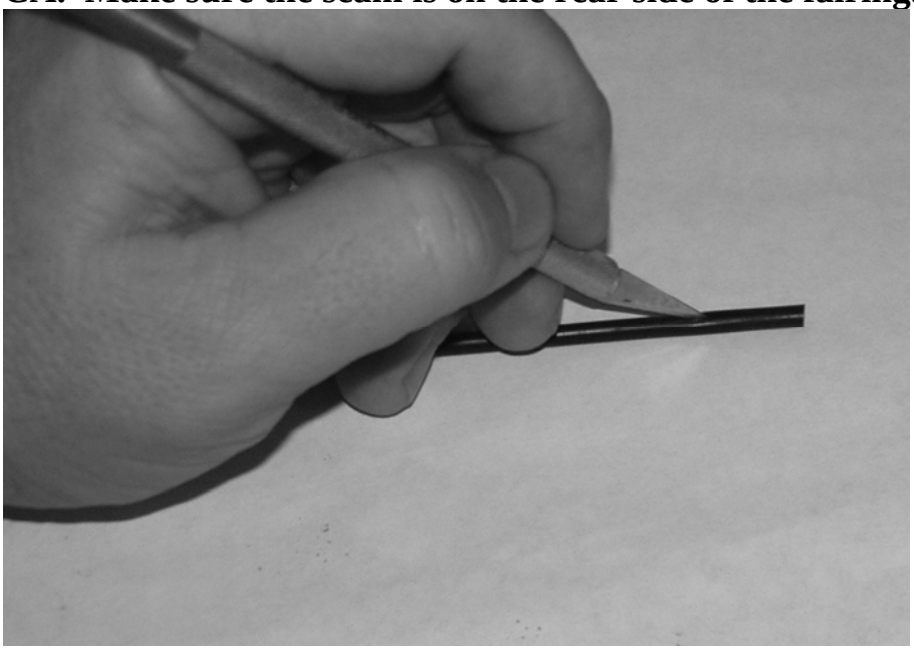
14. Use a rotary tool with a grinding bit or a small file to create a flat spot on the tailwheel wire for the set screws in the aluminum fittings to seat against. Reassemble the unit and apply Loctite to the threads on the setscrews and reinsert into the aluminum fittings and tighten snug. Slide the tailwheel onto the wire and secure with the included wheel collar.
15. Position the tailwheel assembly on the rear bottom of the fuselage and be sure the tailwheel wire is aligned with the rudder hinge line. Secure the tailwheel with a couple of pieces of masking tape while you drill 2 holes with a 1/16" drill bit. Apply a few drops of thin CA to the holes and allow to dry then secure the assembly to the bottom of the fuselage as shown with the 2 provided coarse thread wood screws and 2 washers.

Fuselage Assembly

16. We'll begin by installing the landing gear. Locate the aluminum main landing gear, 4 3mm bolts, lock nuts and washers. Insert the gear into the slot on the bottom of the fuselage and center it in the slot. Secure the landing gear with 4 3mm bolts, washers and nylon insert lock nuts by inserting the bolts and washers into the pre-drilled holes in the aluminum gear mounts inside the fuselage with a long T-handle wrench. Secure with the 3mm nylon insert lock nuts.

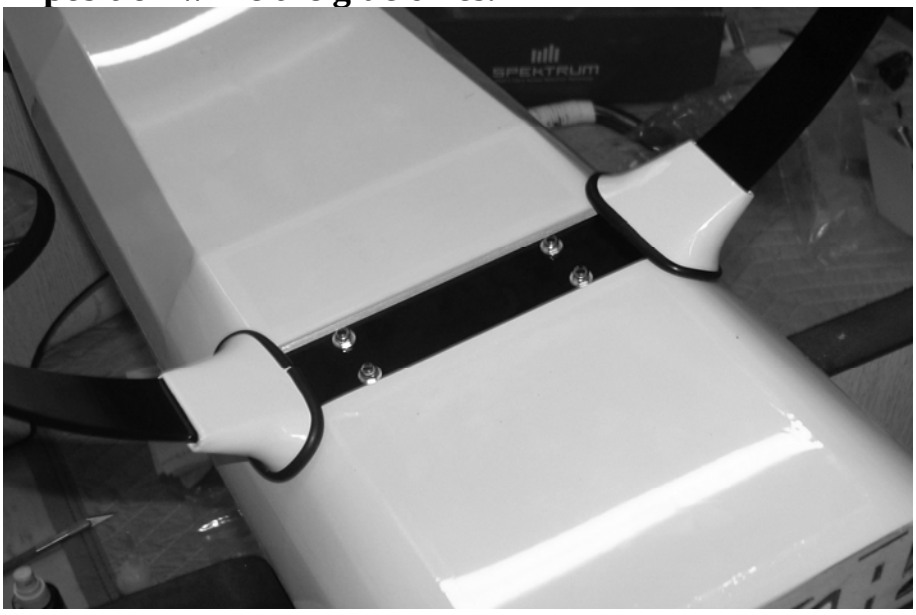


17. Locate the 2 fiberglass landing gear fairings and the black neoprene tubing. Use a sharp hobby blade and cut through one wall of the tubing horizontally along the length of the tubing. Press the tubing onto the edges of the fairing as shown and secure with thin CA. Make sure the seam is on the rear side of the fairing.



18. Slide the fairings over the landing gear and against the sides of the fuselage. You may need to open the hole in the fairing slightly with a rotary tool bit for proper fit. Use a pencil to mark the location of the bottom of the fairing on the landing gear and then remove the fairing.

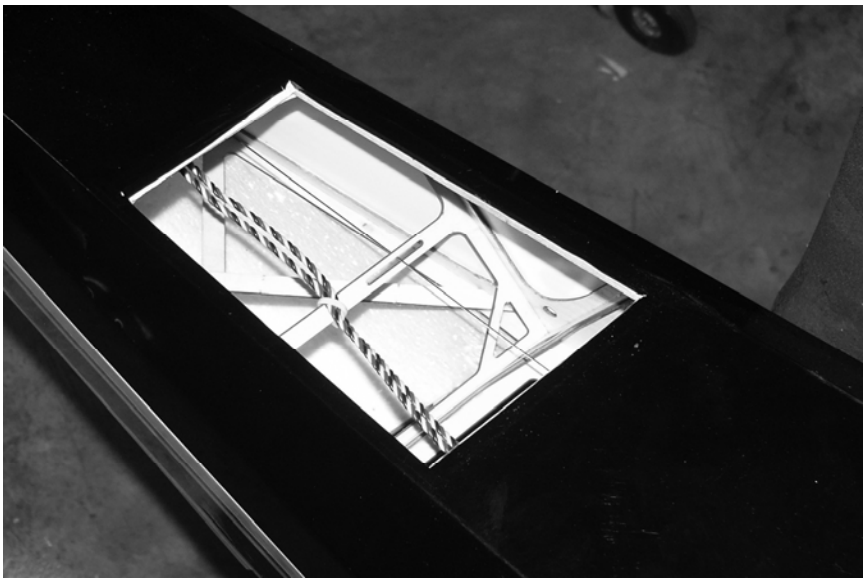
19.Apply a thick bead of silicon glue or epoxy just below your pencil line all the way around the gear. Slide the fairing back into place and apply masking tape to keep it in position while the glue dries.



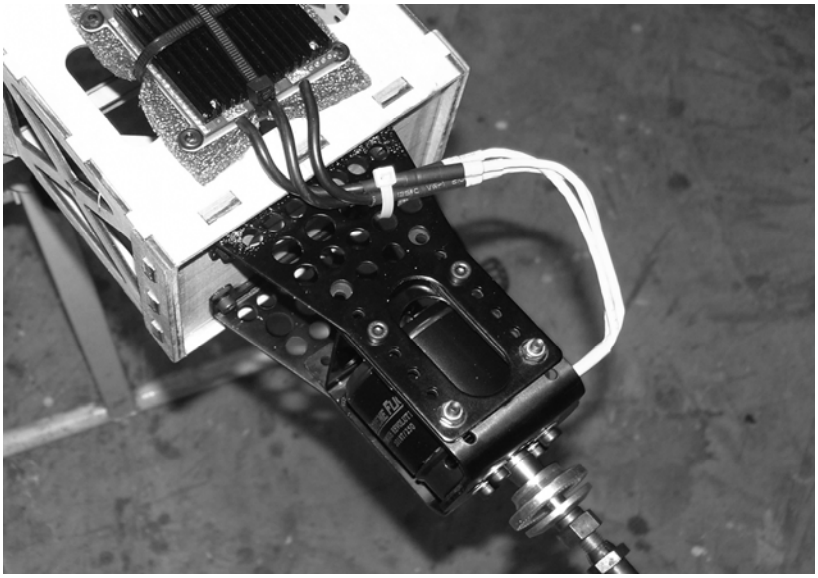
20. Locate the 2 axles, 2 locking nuts, 2 wheels, 2 wheel collars and 2 wheel pants from the hardware package. Place the wheel onto the axle and secure with a wheel collar. Place the threaded portion of the axle through the hole in the landing gear and screw the lock nut onto the axle, but do not tighten completely. There is a slot pre-cut in the wheel pant to allow it to fit over the axle. Slide the wheel pant into position over the axle and tighten the nut on the axle, taking care to make sure the wheel pant is positioned properly.

When satisfied with the position of the wheel pants, drill a 1/16" hole though the plywood plate that is glued inside the pant at the location of the hole in the landing gear. Secure the pant in position with a single wood screw. Repeat this process for the remaining wheel pant.

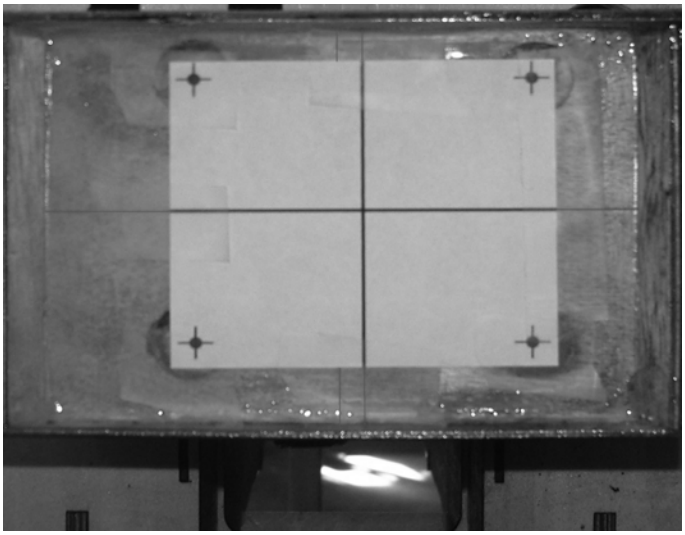
21. While the Extra is still upside down let's install the rudder and finish up the tailwheel installation as well as opening the exit hole for the incoming air that cools the batteries. Apply 30 minute epoxy to the holes in the rudder post and to the rudder hinges. As you position the rudder onto the vertical fin, be sure the tailwheel tiller arm is inserted into the ball link. Push the rudder into position and wipe away any excess epoxy with a paper towel and denatured alcohol. Use a #11 blade to remove the covering from the panel in the bottom of the fuselage as shown in the following picture. Seal the edges of the covering to the airframe with a sealing iron.



22. Next let's install the motor/engine. We have made this process very easy. The center and offset marks have been scribed into the front of the firewall with a laser. Holes have also been marked which correspond with the mounting holes for the cage mount used with our recommended Torque outrunner. If using our recommended motor set-up and cage mount simply drill the mounting holes at the designated location and bolt the motor/mount assembly in place. If using a different motor or mount use the marks on the firewall to determine proper motor position. Be sure to use the offset line to the right of the vertical center line to accommodate for the motor offset due to the built in right thrust angle in the motor box. Distance from the front face of the motor box to the motor drive washer is 5 1/8". I highly recommend mounting the ESC on the bottom of the motor box which will place it directly in the path of the airflow entering the opening in the cowl just below the spinner.



23. For mounting a gas engine, contact the engine manufacturer for a mounting template, print it and tape into position on the front of the firewall, being careful to align the vertical positioning mark with the laser scribed vertical line to the right of the center line and the horizontal positioning mark with the laser scribed horizontal line on the firewall. Drill the proper size hole at each location and mount the engine with the bolts recommended by the manufacturer. Distance from the face of the firewall to the thrust washer for the gas version of the Extra is 6.25 inches. It may be necessary to use standoffs to achieve this measurement.

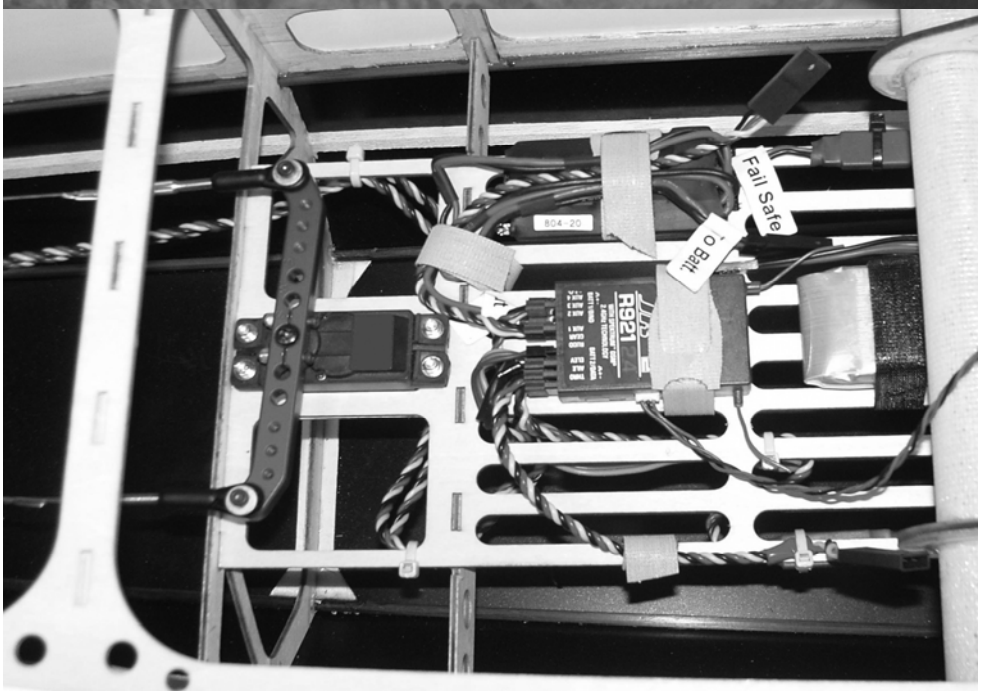


23. Install your rudder servo using the supplied hardware with the output shaft toward the rear of the plane. We used the older Hitec 5945 and Hitec 5985 in our prototypes with great results (this servo has recently been updated and re-released as the Hitec 7985). We are using the SWB 3.5" offset rudder arm. We highly recommend the use of this quality product to ensure correct geometry.

24. Next let's install the pull-pull rudder cables. Look into the rear of the fuselage and you will see a nylon tube installed on each side of the fuselage. Use a pieces of wire or T-pin to open the holes for the pull-pull cables on each side of the fuselage.

25. Assemble one end of the linkage by inserting the pull-pull cable into one of the aluminum tubes, through the hole in the brass pull-pull fitting and back through the crimp. Loop the cable back through the crimp a second time and crimp with side cutters.

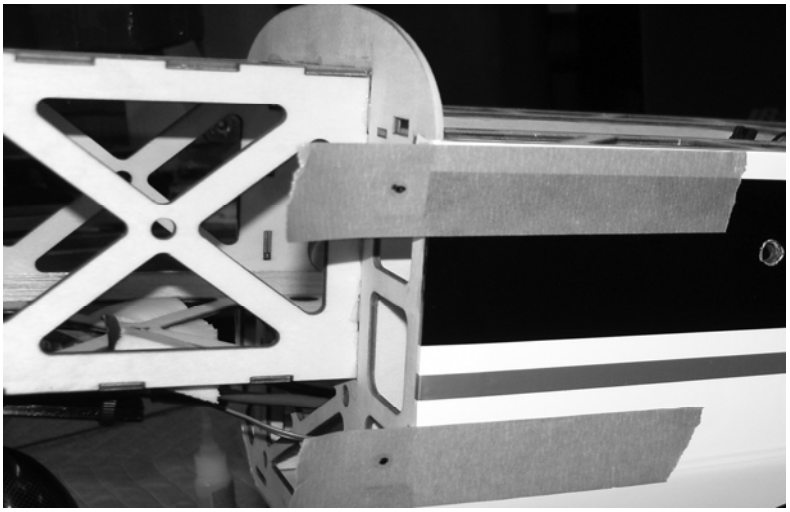
Insert the bare end of the cable into the slot in the rear of the fuselage and feed it forward into the canopy area and make up the same type of linkage as you did previously. Electronically center your servo. Secure the linkage at both ends with a 3mm bolt and nylon insert lock nut. Repeat for the other side.



26. Remove the covering over the holes in each side of the rear of the fuselage for the elevator servos. Attach a 36" extension to the servo lead and install the servos with the output shafts toward the rear of the fuselage using the manufacturer supplied mounting hardware. Slide both stab/elevator assemblies onto the carbon fiber mounting tube and secure with 2 3mm bolts inserted through a washer and the mounting tabs and into the corresponding blind nuts already installed in the fuselage. Thread a ball link on each end of a titanium pushrod and secure to the servo arm and elevator control horns with a 3mm bolt and nylon insert locknut. Again we recommend the SWB 1.5 inch servo arm for elevator actuation. Be sure to use a drop of blue Loctite on all bolts!!!

Now let's mount the cowl.

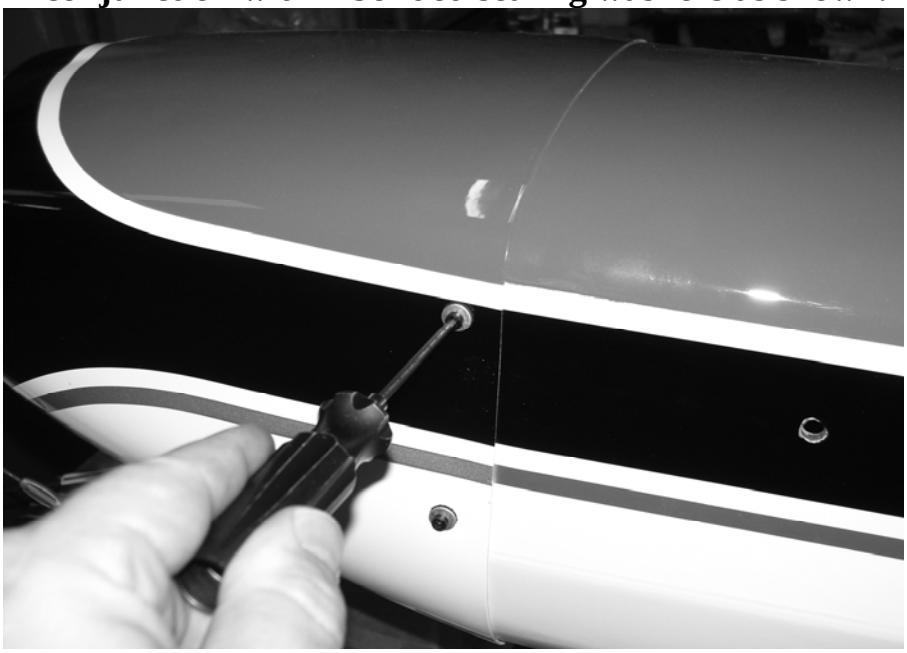
27. Before mounting the cowl place four strips of masking tape on the fuselage as shown and use a felt tipped marker to mark the location of the bolt holes in the cowl mounting tabs.



28. Place the canopy/hatch onto the fuselage **to aid in alignment. Peel the tape back just**

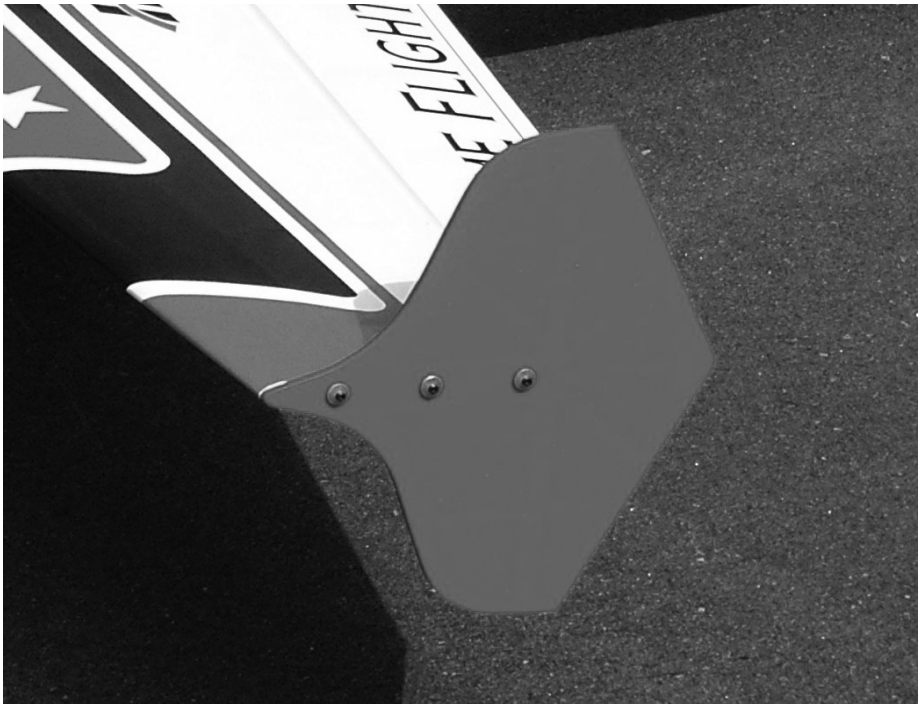
behind the F1 former and place the cowl into position, flush with the rear of the F1 former. Place your spinner (76mm) on the motor to help align with cowl. View the cowl from several angles to insure that it is positioned properly. When satisfied put the four tape strips back into position and drill a 1/8" hole at the location of each of the 4 ink marks.

29. Remove the cowl and soak the cowl mounting tabs with thin CA. Install the 4 3mm blind nuts into the cowl mounting tabs. The cowl is secured using 4 3mm socket head bolts in conjunction with 4 bonded sealing washers as shown.



30. The canopy on the electric version is retained by a dual spring loaded hatch latch mechanism. The wings are retained by inserting the 1/4x20 nylon bolts through the holes in the fuselage just behind the wing tube and into the pre-installed blind nuts in the root rib of the wing. Be careful not to cross thread the bolts and inspect them periodically to insure thread integrity.

31. Included in your Extra kit is a set of side force generators (SFGs). These aerodynamic devices add to the effective side area of the aircraft making knife edge flight and other maneuvers that depend on rudder authority easier and more stable. The SFGs also tend to make the aircraft more stable in high angle of attack maneuvers (harriers). I highly recommend that you install them on your aircraft and experiment. They are secured to each wingtip with 3 3mm bolts and a plastic washer inserted into pre-installed blind nuts in each wing tip.



This completes the assembly of the 78 inch Extra 300. As a final step clean the entire aircraft with glass cleaner, then apply a coat of spray-on wax and buff the finish to a high gloss. My favorite product for this is Eagle One Wet Wax AS-U-DRY, available in the automotive section of most Wal-Marts, K-marts, Sears, Targets, etc. People often ask me at trade shows how I get the planes to look so shiny, this is my secret. You may wish to apply all of your graphics before applying the coat of wax.

Set-up and trimming

Besides basic assembly, this is the most important part of preparing your airplane for flight. It can also be the most time consuming, but once your plane is properly dialed in you will agree it was time well spent.

The center of gravity range for the 78 inch Extra 300 begins at 5.5" from the leading edge of the wing measured at the root and extends back ¾" from this point. CG is determined with the Extra in the upright position. One of the best ways to dial in the proper CG for your aircraft is the 45 degree line test. Fly the aircraft in front of you from left to right (or right to left if you prefer) at full throttle. Pull the aircraft into a 45 degree up line and establish this line. Roll the aircraft inverted, neutralize the elevator and pay close attention to what the plane does. Ideally the plane will continue on this line for several hundred feet before it starts to slowly level off. If the airplane immediately drops the nose and dives toward the ground it is nose heavy. If it begins to climb inverted toward the gear it is tail heavy. There is no need to have the Extra excessively tail heavy to perform 3D maneuvers. At this time you will also want to balance your plane laterally. Add a small amount of weight to the wingtip to achieve proper lateral balance.

Control surface throws

I highly recommend that you purchase a throw meter that measures in degrees. There are several units available commercially. These units are a great aid in set-up and definitely beat the "that looks about right" method. For any type of precision flying, surfaces that travel equal distances are a must. The following control surface travels are what I use on my own Extra. These are a good starting point, but are by no means the only way to set up the Extra. Start here and then adjust to fit your own preferences and style of flying.

Elevator: 8-10 degrees low rate, 18-20% exponential; all you can get high rate, 60-65% exponential

Aileron: 20 degrees low rate, 30-40% exponential; all you can get high rate, 65-70% exponential

Rudder: 20 degrees low rate, 50% exponential; all you can get for high rate, 80-90% exponential.

Again, this is just a starting point. Adjust to your liking.

Thanks again for your purchase of the Extreme Flight RC 78 inch Extra 300 ARF. I hope you enjoy assembling and flying yours as much as I have mine.

See you at the flying field!

Chris Hinson

Extreme Flight RC